

WHAT IS CLAIMED IS:

1. A reflection type mask blank for EUV exposure, comprising:
 - a substrate;
 - a multilayer film which is formed on the substrate so as to reflect an EUV light ray; and
 - a light absorber layer which is formed on the multilayer film so as to absorb the EUV light ray,
 - wherein the multilayer film has flatness with respect to a surface thereof, and
 - the flatness is 100 nm or less.
 2. A reflection type mask blank for EUV exposure, comprising:
 - a substrate;
 - a multilayer film which is formed on the substrate so as to reflect an EUV light ray;
 - a light absorber layer which is formed on the multilayer film so as to absorb the EUV light ray; and
 - a stress correction film which corrects warping of a surface of the multilayer film,
 - wherein the warping is formed by warping of the substrate and stress of the multilayer film.
 3. A mask blank as claimed in claim 2, wherein:
 - the stress correction film has tensile stress, and is placed between the substrate and the multilayer film.
 4. A mask blank as claimed in claim 2, wherein:
 - the stress correction film has compressive stress, and is placed on a back surface of the substrate.

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5. A mask blank as claimed in any one of claims 2 through 4,
wherein:

the stress correction film is made of material containing Ta.

6. A mask blank as claimed in claim 5, wherein:

the stress correction film is made of material containing Ta as a major component and at least B.

7. A reflection type mask for EUV exposure produced by using the reflection type mask for EUV exposure blank claimed in claim 1 or 2.

8. A method for manufacturing a reflection type mask for EUV exposure produced by using the reflection type mask for EUV exposure blank claimed in claim 1 or 2.

9. A method for manufacturing a semiconductor device, wherein:
a pattern is transferred on the substrate by using the reflection type
mask for EUV exposure claimed in claim 7.

10. A substrate with a multilayer film for reflecting an EUV light ray onto a substrate, wherein:

the multilayer film has flatness with respect to a surface thereof, and the flatness is 100 nm or less.

11. A substrate with a multilayer film for reflecting an EUV light ray onto a substrate, comprising:

a stress correction film which corrects warping of a surface of the multilayer film,

the warping being formed by warping of the substrate and stress of the multilayer film.

12. An EUV reflection mirror produced by using the substrate with the multilayer film as claimed in claim 10 or 11.

13. A reflection type mask blank for exposure, comprising:
- a substrate;
 - a multilayer film which is formed on the substrate so as to reflect a light ray; and
 - a light absorber layer which is formed on the multilayer film so as to absorb the light ray;
 - wherein the multilayer film has flatness with respect to a surface thereof, and
 - the flatness is 100 nm or less.
14. A reflection type mask blank for exposure, comprising:
- a substrate;
 - a multilayer film which is formed on the substrate so as to reflect a light ray;
 - a light absorber layer which is formed on the multilayer film so as to absorb the light ray; and
 - a stress correction film which corrects warping generated on a surface of the multilayer film when the stress correction film is not formed.
15. A reflection type mask for exposure produced by using the reflection type mask blank for exposure claimed in claim 13 or 14.
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